Kenyemys williamsi, a Fossil Pelomedusid Turtle from the Pliocene of Kenya

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ABSTRACT. *Kenyemys williamsi*, a new genus and species of pelomedusid turtle from the Pliocene of northwestern Kenya, is described. *Kenyemys* was a freshwater turtle whose relationships to other African pelomedusids cannot at present be determined.

INTRODUCTION

During the mid 1960's, a series of Harvard paleontological expeditions to the Turkana District of northwestern Kenya, led by the late Professor Bryan Patterson, recovered a large quantity of fossil chelonian material. The majority of these specimens represent two new types of pelomedusid turtles, one common and the other rare (Wood, 1971). This festschrift provides an appropriate occasion for formally naming the latter taxon in honor of Ernest E. Williams.

SYSTEMATICS

Order Testudines
Suborder Pleurodira
Family Pelomedusidae
Kenyemys gen. nov.
Figures 1–5

Type species. K. williamsi sp. nov.

Distribution. Pliocene, northwestern Kenya

Diagnosis. Differing from all other members of the family by the following combination of characters: 1) a series of elongate tuberosities forming an interrupted keel extending along the midline rearward from the dorsal surface of the second neural bone; 2) six neural bones forming a continuous series, the anterior end of the first abutting directly against the rear margin of the nuchal bone and the sixth one being heptagonal; 3) outer corners of nuchal bone extending beyond lateral margins of first vertebral scute; 4) pentagonal shape of first vertebral scute; 5) only eighth and posterior part of seventh pairs of pleural bones meeting at midline of carapace; 6) anterior plastral lobe truncated; 7) triangular intergular scute not overlapping anterior end of entoplastron and only partially separating the gular scutes along the midline axis of the plastron.

Etymology. The generic name refers to Kenya, the nation within whose borders this turtle was found.

Discussion. Two pelomedusid subfamilies, the Podocneminae and Pelomedusinae, can be recognized. However, their critical distinguishing characters are based primarily on skull morphology and cervical vertebra structure (Wood, 1971). Because these parts of the skeleton are not known for *Kenyemys williamsi*, its subfamilial allocation is not at present possible.

In the past, many African pelomedusids have been referred to the South American genus *Podocnemis*. Such iden-

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tifications have generally been based on just a few shell characters (particularly the shape and arrangement of the neural bones as well as the presence of subcircular, laterally-placed mesoplastra) which, by themselves, are generally of limited taxonomic importance at the generic level.

Invariably, when better material becomes available or more thorough studies are carried out, these purported African representatives of *Podocnemis* prove referable to some other genus. Thus, "*Podocnemis*" *congolensis* is now *Taphrosphys* (Wood, 1975), "*Podocnemis*" *antiqua* is *Shweboemys* (Wood, 1970), and "*Podocnemis*" *madagascariensis,* whose origins surely lie within Africa on the basis of fossil material from the Miocene of central Africa that I currently have under study, is now generally accepted as representing a distinct genus, *Erymnochelys* (Pritchard, 1979). Moreover, it seems very possible that shell material from the Oligocene Fayum Depression of Egypt which has been described as *Podocnemis fajumensis* (including its synonym *P. blanckenhorni;* see Wood, 1971) probably represents the same taxon as the single skull which has been designated the type of *Dacquemys* (Williams, 1954).

The name *Podocnemis*, therefore, has been used in Africa much as it has been applied to other fossil pelomedusids elsewhere (see, for example, Wood and Gamaro's 1971 description of "*Podocnemis*" *venezuelensis),* as a catch-all taxon to which a variety of pelomedusids have been referred more for convenience than anything else. (Recently-collected additional material of "*Podocnemis*" *venezuelensis,* for that matter, clearly indicates that it is a new genus.) As the fossil record of pelomedusids continues to improve, it becomes increasingly apparent that there is no compelling reason to believe that the South American genus *Podocnemis (sensu strictu)* has ever reached other continents.

The suite of features which characterizes the pelomedusid described here clearly precludes its reference to *Podocnemis.* Moreover, its shell is markedly different from that of other African pelomedusids including the African precursors of *Erymnochelys madagascariensis* (see Table 1).

On this basis, recognition of a new genus seems appropriate.

Kenyemys williamsi sp. nov.

Type. National Museum of Kenya (NMK) LT 127, a nearly complete but somewhat crushed shell.

Hypodigm. The type and NMK LT 128, the anterior half of a plastron.

Horizon and locality. Pliocene (Lothagam—1 [Patterson, Behrensmeyer, and Sill, 1970], now regarded as being somewhere in age between 5 and 6 million years B. P. [Maglio, 1974: Fig. 2]), Lothagam Hill, southwestern Turkana District, Kenya (approximately 2°53′N, 36°04′E).

Diagnosis. As for the genus.

Etymology. I take great pleasure in naming this species in honor of Ernest E. Williams, in recognition of his significant contributions to knowledge of both fossil and living turtles, not to mention herpetology in general.

Description. Essentially all of the shell of *Kenyemys williamsi* has been preserved. Despite some distortion resulting from cracking and crushing, it is apparent that the carapace was roughly oval in outline and probably moderately arched. Restorations of the shell are shown in Figures 3–5.

At the front of the carapace, the nuchal bone is hexagonal and slightly broader than long. There are six neurals arranged along the midline in an uninterrupted series. The fusiform first neural abuts squarely against the rear margin of the nuchal; posteriorly it is rounded to fit into a semicircular notch at the front of the second neural. Neurals two through five are of approximately the same size

TABLE 1. SHELL CHARACTERS OF *KENYEMYS WILLIAMSI* COMPARED WITH THOSE OF OTHER SOMEWHAT SIMILAR AFRICAN PELOMEDUSID TURTLES.

CHARACTER	*Kenyemys williamsi*	*Shweboemys antiqua*	*Stereogenys**	*Taphrosphys congolensis*†	*"Podocnemis"*‡	*Erymnochelys*§	*Pelomedusa*
1) Keel present?	yes	no	no	no	no	no	no
2) Shape of last neural bone	heptagonal	pentagonal	pentagonal	pentagonal	pentagonal	pentagonal	somewhat variable, although usually pentagonal
3) total number of neural bones	6	6	7	7	6	6	7–8
4) does first neural bone abut directly against posterior end of nuchal bone?	yes	yes	no	yes	yes	yes	usually but not always
5) does nuchal bone extend beyond lateral margins of first vertebral scute?	yes	no	yes	no	no	no	no
6) shape of first vertebral scute	pentagonal	hexagonal	pentagonal	pentagonal	heptagonal	pentagonal	pentagonal
7) number of pairs of pleurals meeting at midline of carapace between last neural and suprapygal	1½	2½	½	1½	2½	2½	variable: ½–2
8) shape of carapace	oval	cordiform	oval	?	oval	oval	oval
9) shape of anterior plastral lobe	truncated	rounded	truncated	rounded	variable: rounded to truncated	rounded	rounded
10) shape of intergular scute	triangular	variable: triangular to pentagonal	pentagonal (*S. libyca*); heptagonal (*S. cromeri*)	heptagonal	triangular (except pentagonal in *P. bramlyi*)	triangular	pentagonal

11)	does intergular overlap onto anterior end of entoplastron?	no	yes	yes	yes	variable: may or may not overlap	usually not; if so, only slightly	yes
12)	does intergular separate either the gular or humeral scutes in midline?	anterior part of gulars only	gulars always completely separated, and anterior part of humerals sometimes	both gulars and humerals completely	both gulars and humerals completely	variable: may separate only anterior part of gulars, all of gulars, or even some or all of the humerals as well	anterior part of gulars only	gulars always and part or all of the humerals as well
13)	additional features	—	a) first vertebral scute reaches anterior margin of carapace, preventing first pair of marginals from meeting in midline b) posterior plastral lobe 1½ times longer than anterior lobe c) pleurals flat rather than curved, sloping away from blunt continuous midline ridge (not, however, a keel)	a) axial and inguinal buttresses weakly developed	a) posterior plastral lobe roughly 2 times longer than anterior lobe b) low ridge on visceral surface of either side of posterior plastral lobe running parallel to to outer rim.	—	a) seventh pair of pleurals parallel-sided or even slightly constricted laterally rather than expanded	a) fenestration of the central portion of the plastron often persists in mature adults

*Two species have been described, *S. cromeri* and *S. libyca*, material of the latter being considerably better preserved than that of the former.

†Part of the data for this column is derived from previously unreported specimens whose description I am currently preparing.

‡I tentatively refer four species to this name of convenience: *"P." aegyptiaca*, *"P." bramlyi*, *"P." fajumensis*, and *"P." podocnemoides*.

§This genus is at present monotypic and confined to Madagascar. However, fossil material from Africa's Central Rift Valley which I currently am studying is clearly referable to the genus. Hence, inclusion of this genus here seems appropriate.

and roughly hexagonal, having antero-lateral sides that are much shorter than the postero-lateral ones. The sixth neural is considerably longer than wide and instead of being pentagonal, as is typically the case for the last neural in podocnemine pelomedusids, it is heptagonal. In contrast to the common fossil pelomedusid from Lothagam, in which three pairs of pleurals are involved, separation between this terminal neural and the triangular suprapygal is effected only by the midline union of part of the seventh and all of the eighth pair of pleurals. Extending along the antero-posterior ridge of the carapace is a series of keels which become progressively more prominent towards the rear of the shell. The first of these protrudes only slightly from the surface of the second neural and the front half of the third. The second, arising from the posterior surface of the third neural and continuing back onto the front half of the fifth, has a higher crest than the preceding one, while the third and highest of the keels extends from the rear portion of the fifth neural back onto the eighth pair of pleurals. A median bulge on the suprapygal suggests that a fourth keel may also have been present. Carapacial keels are unusual features in pelomedusid turtles. Immature examples of *Podocnemis unifilis* and *P. sextuberculata* can have quite prominent tubercular keels (P. C. H. Pritchard, personal communication). Similar but less pronounced keeling is also characteristic of adults of various species of *Pelusios* (Loveridge, 1941; Pritchard, 1979).

Owing to damage at the posterior end of the carapace, it is not possible to determine the shape of the pygal, but it was probably rectangular as in all other pelomedusids. Nine peripheral bones remain attached to the carapace on either side and, in addition, two complete but disarticulated peripherals as well as several fragments have also been preserved, so that it appears likely that the actual complement of peripherals was the normal pelomedusid number of eleven pairs. Flanking the neurals are eight pairs of pleurals which decrease in size from front to rear.

Except for the shape of the first vertebral, the scute pattern on the carapace of *Kenyemys williamsi* is not exceptional. The first vertebral was pentagonal, with its apex directed forward and its lateral sides more or less parallel. The lateral ends of the first pair of marginal scutes extended beyond the greatest width of the first vertebral. The nuchal bone at its greatest breadth extends beyond the lateral boundaries of the first vertebral.

The anterior plastral lobe of *Kenyemys williamsi* is truncated, with pronounced notches occurring at the junction between the gular and humeral scutes along the epiplastral margin to mark the position where the sides begin to curve laterally. The small, triangular intergular scute did not extend back onto the entoplastron in either of the two known specimens of *Kenyemys*. The plastral scute sulci and suture patterns conform to the typical pelomedusid configuration.

Most of the pelvis is preserved in the type but is somewhat crushed and distorted. From what can be seen, it appears to be similar to those of other podocnemine pelomedusids. The upper half of the acetabulum is formed by an excavation in the outer surface of the ilium, while the ischium and pubis each contribute about equally to the formation of the lower half of this socket. A low ridge on the visceral surface of the plastron, formed by projections running inward from the base of the ischia, serves to connect these elements at the midline.

Estimated measurements for the shell are: length of carapace, 32 cm; length of plastron, 28 cm. The plastral formula is: abdominal>pectoral>femoral>anal>gular>intergular>humeral.

DISCUSSION

Kenyemys was clearly a fresh water turtle. The sediments of the Lothagam–1

unit as well as the fauna recovered from it both indicate a mixture of channel, floodplain, and backwater depositional environments (Patterson, Behrensmeyer, and Sill, 1970). Most of the Lothagam pelomedusids were recovered from sandstones, the type of *Kenyemys* being the only one to have been found in a rather limey clay. This might indicate that *Kenyemys* occupied a somewhat different kind of habitat than did the other, much more abundantly represented Lothagam pelomedusid. Whatever the case, it seems reasonable to suppose that these two species were broadly sympatric, as both pelomedusid taxa have been discovered at essentially the same stratigraphic level.

The relationship of *Kenyemys* to other African pelomedusids is at present obscure. Perhaps the most distinctive feature of its shell is the midline keel of the carapace, a character not present on any other adequately known podocnemine from the continent or adjacent island of Madagascar.

Rather tenuous evidence exists to suggest that there may have been another African fossil pelomedusid characterized by a keeled carapace. An isolated nuchal bone has been referred to *Latisternon microsulcae,* the type of which is a single left epiplastron from Olduvai Gorge, Tanzania (Auffenberg, 1981). This nuchal bone was found at a different site within Olduvai Gorge than the type specimen, so the association of the fragments is questionable. Whether or not the association is correct, the fact remains that a median keel is reported to rise from the dorsal surface of the nuchal. The available evidence is insufficient to determine either the extent of this keel or whether it was continuous or interrupted along its length. What little is known, does, however, clearly reveal differences in detail, since the keel of *Kenyemys* first appears farther back along the midline of the carapace. Moreover, the proportions of the nuchal bones in *Kenyemys* and *Latisternon* differ markedly, that of the former being broader than long whereas that of the latter is considerably longer than broad. No reason exists, therefore, to believe that there is any close relationship between these two taxa based on their common possession of a carapacial keel.

With respect to another notable feature of the carapace of *Kenyemys*, only *Stereogenys libyca,* among other African podocnemines, also has a first vertebral scute whose lateral borders lie within the confines of the nuchal bone. But in other features (e.g., number, shape, and arrangement of neural bones, shape of anterior plastral lobe and patterns of scutes thereon) *S. libyca* differs markedly from *Kenyemys* and there is no reason to postulate a close relationship between these species either.

The truncated anterior plastral lobe of *Kenyemys* is superficially similar to those of several other African fossil pelomedusids (e.g., *"Podocnemis" podocnemoides* from the late Eocene of Egypt, *"Podocnemis" fajumensis* from the Oligocene of Egypt, *"Podocnemis" aegyptiaca* from the Miocene of Egypt, both species of *Stereogenys* and *Latisternon microsulcae* from the Pleistocene of Tanzania) but differs in detail. For example, the intergular scute of *"Podocnemis" podocnemoides,* while triangular, is relatively large and extends well back onto the surface of the entoplastron. Moreover, the gulars are small, triangular scutes confined to the epiplastra (Wood, 1971: Fig. 5). *"Podocnemis" fajumensis* and *"Podocnemis" aegyptiaca* have virtually identical anterior plastral lobes. In both, the triangular intergular scute apparently varied in size, in some cases being confined to the median portions of the epiplastra while in others extending slightly or even considerably back onto the entoplastron. Further, in all cases, the lateral extent of the anterior truncation is not proportionately so broad as in *Kenyemys* (Wood, 1971: Figs. 7, 8, 10). The lateral extent of the truncated part of the anterior lobe of *Latisternon* is also considerably

less than in *Kenyemys*. Moreover, *Latisternon*'s intergular was pentagonal and reached back onto the entoplastron, while its gulars were triangular and confined to the surface of the epiplastra. Both species of *Stereogenys* also had large intergulars, pentagonal in *S. libyca* and heptagonal in *S. cromeri*. Finally, for all of these turtles, other characteristics of the shell preclude the likelihood of any particularly close relationship.

In sum, no probable precursors of *Kenyemys williamsi* can as yet be identified, nor is it at present possible to determine whether this species gave rise to any descendants.

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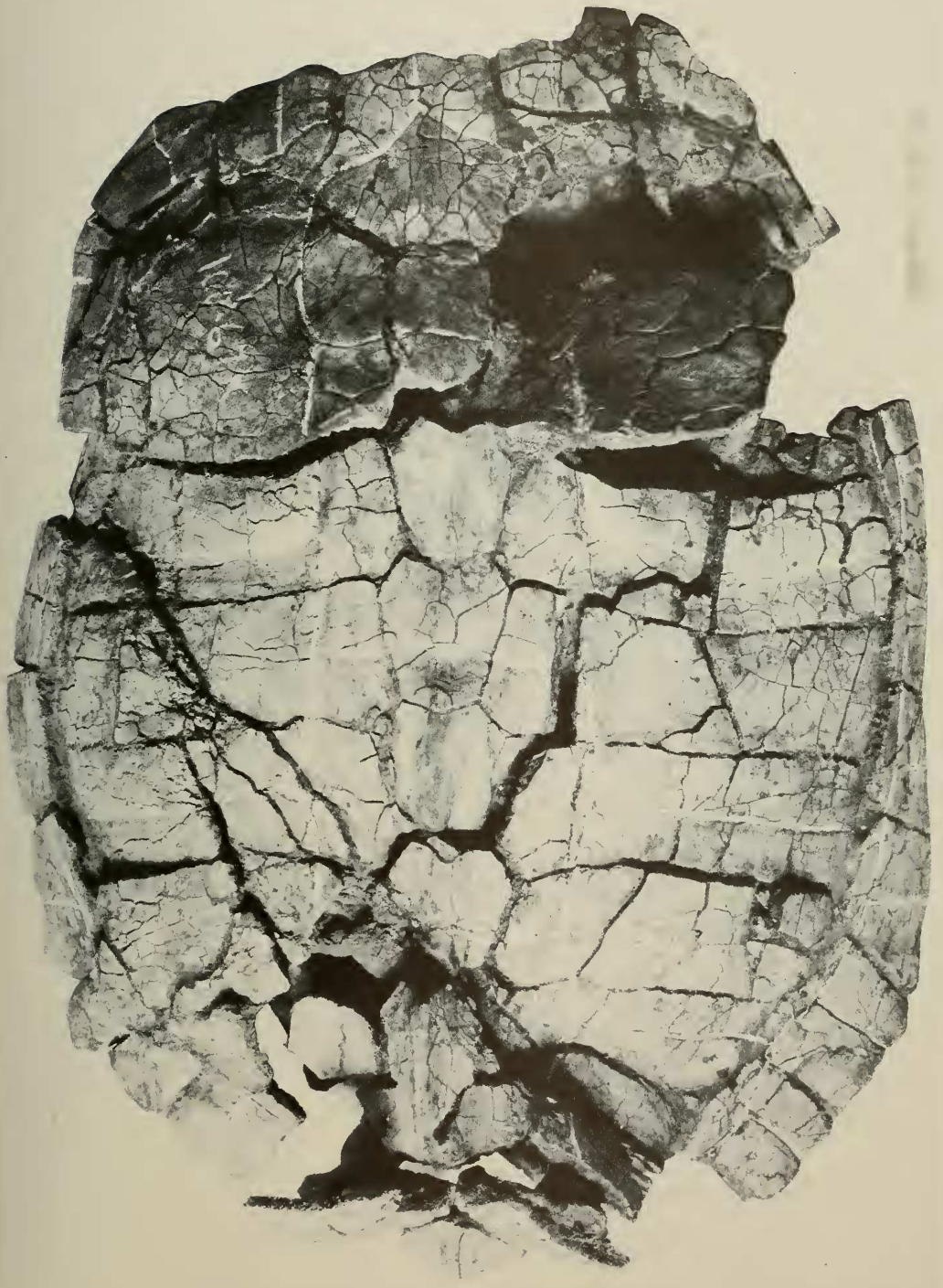

Figure 1. Carapace of *Kenyemys williamsi* (type specimen, NMK LT 127).

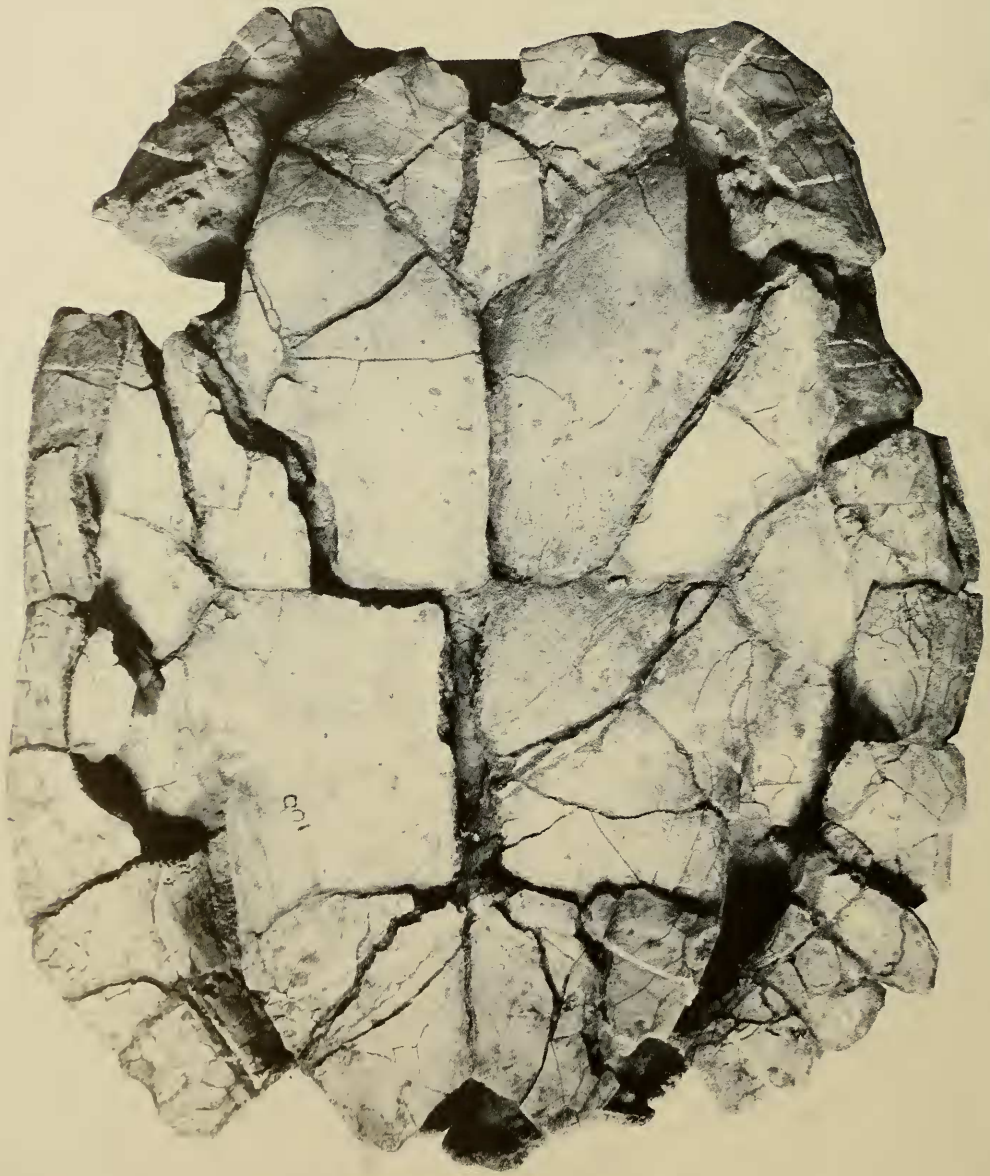

Figure 2. Plastron of *Kenyemys williamsi* (type specimen, NMK LT 127).

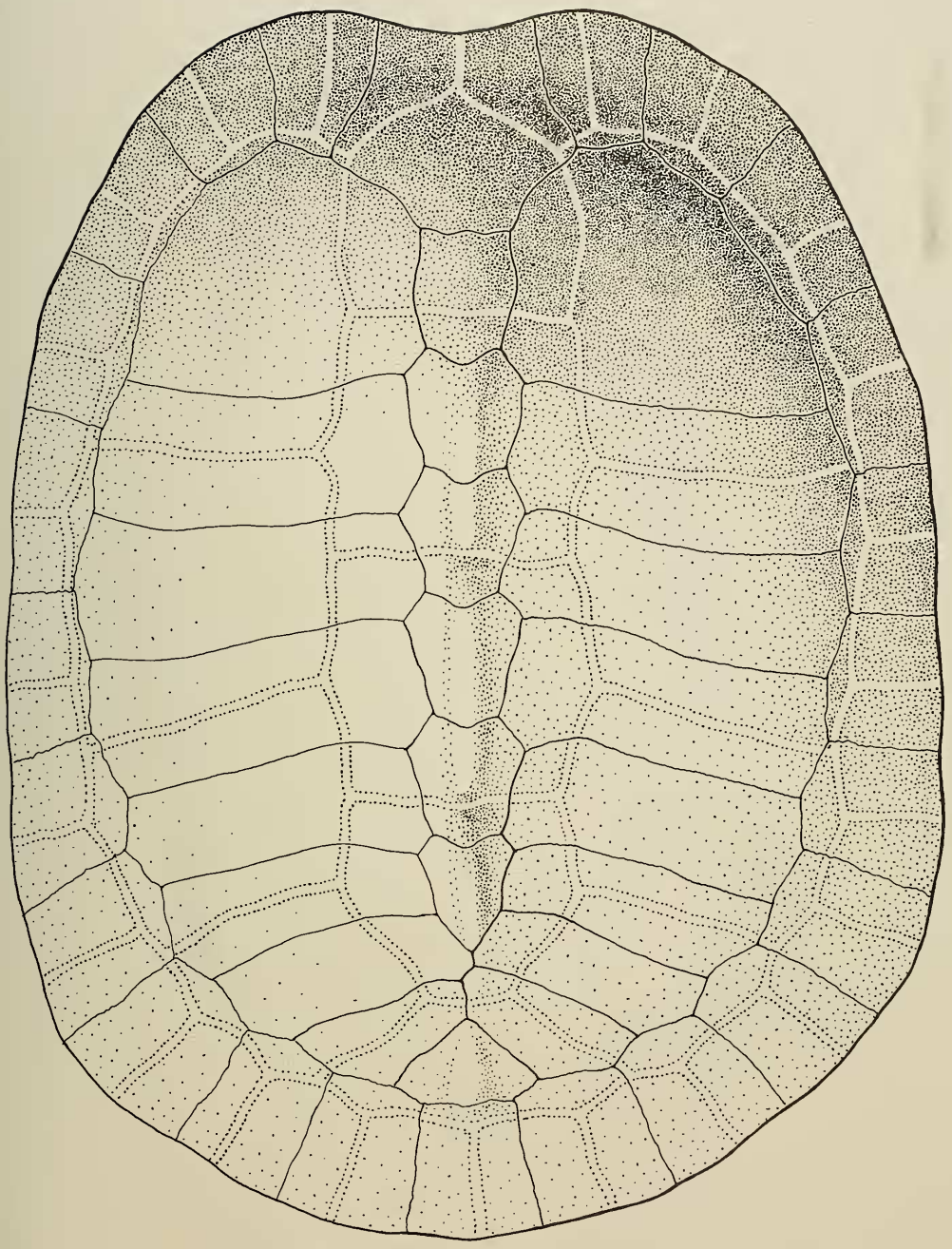

Figure 3. Reconstruction of the carapace of *Kenyemys williamsi*.

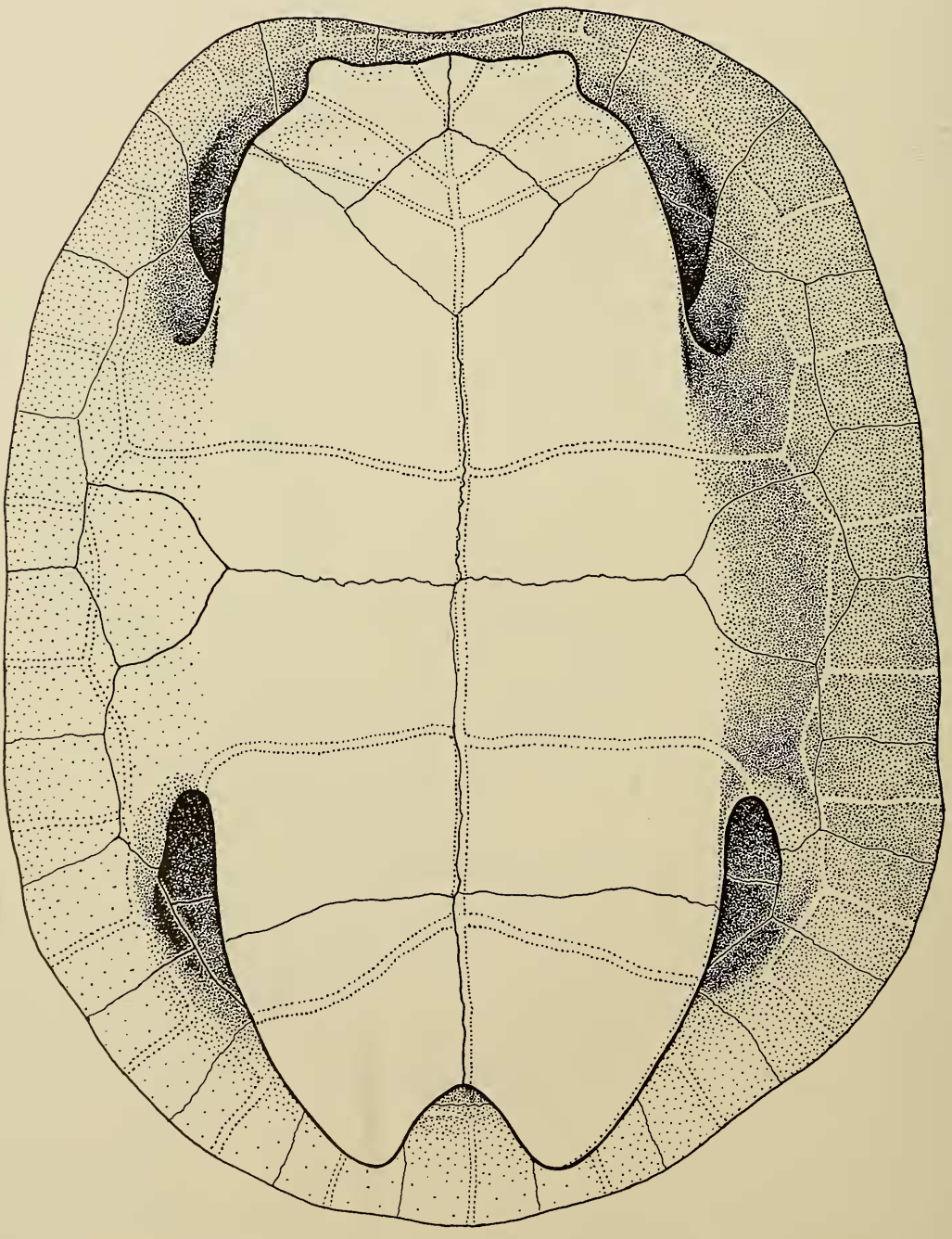

Figure 4. Reconstruction of the plastron of *Kenyemys williamsi.*

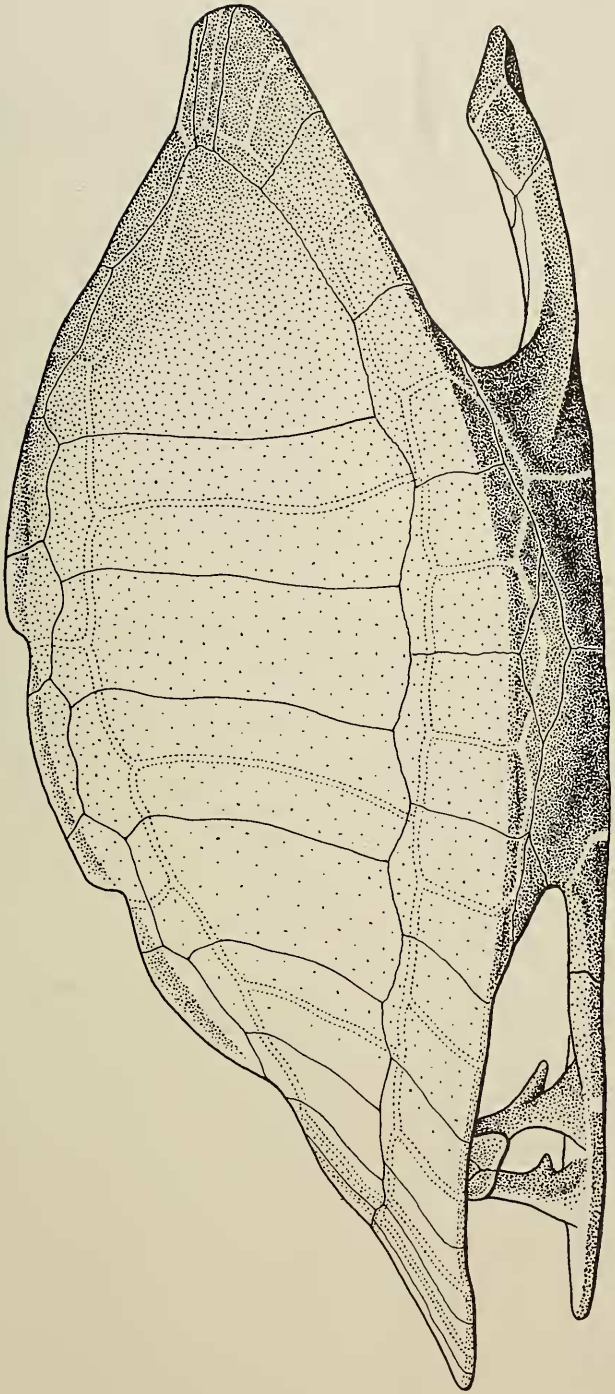

Figure 5. Reconstruction of the shell of *Kenyemys williamsi* in lateral view.